

B.Sc.(Hons.) Horticulture – I semester 2017 Academic Year

Sl. No.	Course No	Title	Credit hours
1.	FSC 101	Principles of Horticulture	2 + 1
2.	FSC 102	Plant Propagation and Nursery Management	1 + 1
3.	VSC 101	Botany of Horticultural Crops	1 + 1
4.	AGM 121	Introductory Microbiology	2 + 1
5.	SAC 101**	Fundamentals of Soil Science	2 + 1
6.	BIC 101**	Fundamentals of Plant Biochemistry	2 + 1
7.	ENG 101*	Comprehension & Communication Skills in English	1 + 1
8.	MAT 113*	Elementary Mathematics	1 + 1
9.	TAM 101*/ ENG 102*	Development Education	0 + 1
10	NSS/NCC*	NSS/NCC	0 + 1 NG
11	PED 101*	Physical Education	0 + 1 NG
12	PED 102*	Yoga for Human Excellence	0 + 1 NG
Total			12 + 9=21
NG - Non gradial but compulsory courses *Common courses ** Common courses for Agri & Horti.			

FSC 101 Principles of Horticulture (2 + 1)

Aim

To teach the basic and fundamental aspects of horticulture

Theory

Unit I Basic concepts of horticulture

Scope and importance – state, national and global scenario of horticultural crops- divisions of horticulture - area and production – export and import - classifications of horticultural crops – nutritive value of horticultural crops – horticultural therapy – horticultural zones of India and Tamil Nadu – horticultural developmental agencies - commodity boards and programmes

Unit II Soil and climatic factors on crop production

Role of season, soil and climate – physical and chemical properties of soil -climatic factors -light, temperature, photoperiod, relative humidity, rainfall, altitude, micro climate, pollution – effect of biotic and abiotic stresses on crop production.

Unit III Crop management

Nursery techniques - clonal orchards – vegetable garden – nutrition garden, kitchen garden and other types of gardens. Planting systems – planning - layout and management of an orchard- wind breaks and shelter beds. Water management - nutrient management – drip and fertigation - soil fertility management - weed management - after cultural practices – mulching – cover cropping – green manuring - application of growth regulators – cropping systems - intercropping and multi-tier cropping. Principles of organic horticulture – GAP and GMP.

Unit IV Growth and development

Important phases of growth and development - bearing habits. Principles and methods of training and pruning of horticultural crops– rejuvenation of old and senile orchards- factors influencing fruitfulness and unfruitfulness – special horticultural practices - pinching – thinning, dis budding, blanching, smudging, notching, ringing.

Unit V Protected cultivation and postharvest handling

Protected cultivation - principles – structures – types and uses - hydroponics – nutrient film technique – areoponics - maturity indices – harvesting, grading and post harvest handling – processing, value addition packing and storage of horticultural produce.

Practical

Features of orchard – tools and implements - planning and layout of orchard– digging of pits and planting. Layout of nutrition garden - preparation of nursery beds – sowing of seeds – planting/transplanting. Layout of irrigation systems - identification and application of manures and fertilizers – preparation and application of plant growth regulators – identification and management of nutritional and physiological disorders in horticultural crops. Study on bearing habits – practice in training and pruning – structures used for protected cultivation. Study of maturity standards – harvesting – grading - packing and storage of horticultural crops.

Lecture schedule

1. Scope, importance and divisions of Horticulture

2. National, state and global scenario - area, production, export and import of horticultural crops.
3. Classification and nutritive value of horticultural crops
4. Horticultural therapy
5. Horticulture zones of TamilNadu and India
6. National and state level agencies commodity board and programmes in horticultural development
7. Role of soil physical and chemical properties in horticultural crop production
8. Role of climatic factors in horticultural crop production
9. Biotic stress and management in horticultural crops
10. Abiotic stress and management in horticultural crops
11. Nursery techniques, clonal orchard and production of healthy planting materials
12. Vegetable gardens – nutrition garden, kitchen garden and other types of gardens
13. Planning, layout and management of an orchard
14. Planting systems and planting
15. Water management including drip irrigation and fertigation system in horticultural crops
16. Nutrient management in horticultural crops
- 17. Mid semester examination**
18. Soil fertility management and fertigation in horticultural crops
19. Weed management in horticultural crops
20. After cultural practices – mulching, cover cropping, green manuring
21. Growth regulators and their applications in horticultural crops
22. Cropping systems – intercropping and multi-tier cropping
23. Principles of organic horticulture
24. Growth and development including bearing habits of horticultural crops
25. Principles and methods of training in horticultural crops
26. Principles and methods of pruning in horticultural crops
27. Factors influencing fruitfulness and unfruitfulness in major horticultural crops
28. Rejuvenation of old and unproductive senile orchards
29. Special horticultural practices - pinching – thinning, dis-budding, blanching, smudging, notching, ringing.
30. Protected cultivation in horticultural crops
31. Hydroponics, aeroponics, nutrient film technique in horticultural crops
32. Maturity indices, harvesting and post harvest handling of horticultural crops
33. Packing and storage of horticultural crops
34. Processing and value addition of horticultural crops

Practical schedule

1. Study of different features of an orchard
2. Tools and implements used for horticultural crop production
3. Planning and layout of an orchard
4. Preparation of pits and planting of fruit plants
5. Layout and study of nutrition garden
6. Preparation of nursery bed and sowing of seeds
7. Containers and protray nursery
8. Layout of different irrigation systems and methods

9. Identification of manures, fertilizers and methods of fertilizer application and fertigation
10. Preparation and application of growth regulators
11. Identification and correction of nutritional and physiological disorders
12. Study of bearing habits in horticultural crops
13. Methods of training and pruning in horticultural crops
14. Observation of structures used in protected cultivation
15. Study of maturity standards, harvesting, grading, packing and storage of horticultural crops
16. Visit to private orchards and cold storage units
17. **Practical Examination**

REFERENCES

Text Books

1. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth – Heinemann, Oxford University Press.
2. Bansil. P.C. 2008. Horticulture in India. CBS Publishers and Distributors, New Delhi.
3. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.

Further readings

1. Bhattacharjee.S.K. 2006. Amenity Horticulture, Biotechnology and Post harvest technology. Pointer publishers. Jaipur
2. Chadha, K.L. 2001, Handbook of Horticulture, ICAR, New Delhi.
3. Chandra, R. and M. Mishra. 2003. Micropropagation of horticultural crops. International Book Distributing Co., Lucknow.
4. Chattopadhyaya, P.K.2001. A text book on Pomology (Fundamentals of fruit growing) Kalyani Publication, New Delhi
5. Christopher, E.P. 2001. Introductory Horticulture, Biotech Books, New Delhi
6. Edmond, J.B. T.L.Senn, F.S. Andrews and P.G.Halfacre, 1975. Fundamentals of Horticulture, Tata MC. Graw Hill Publishing Co.New Delhi
7. George Acquaaah, 2002, Horticulture-principles and practices. Prentice-Hall of India pvt. Ltd., New Delhi.
8. Hartman, H.T. and Kester, D.E. 1986. Plant propagation – Principles and Practices – Prentice Hall of India Ltd., New Delhi.
9. Jacob John. P. 2008. A hand book of post harvest management of fruits and vegetables. Daya publishers.
10. Jitendra Singh. 2006. Basic Horticulture. Kalyani Publishers, New Delhi.
11. Rajan, S. and B.L. Markose. 2007. Propagation of horticultural crops. New India Publishing, New Delhi.
12. Shanmugavelu, K.G., N. Kumar and K.V. Peter. 2005. Production technology of spices and plantation crops. Agrobios, Jodhpur.
13. Singh, D.K. 2008. Hi-tech horticulture. Agrotech publishers, Udaipur

14. Singh, N.P. 2005. Basic concepts of fruit science. International Book Distributing Co., Lucknow.
15. Surendra Prasad and U. Kumar. 1999. Principles of horticulture, Agro – botanica, Bikaner, India.
16. Sureshkumar, P. Sagar and Manish Kanwat. 2009. Post harvest physiology and quality management of fruits and vegetables. Agrotech publishers, Udaipur
17. Utpal Banerjee. 2008. Horticulture. Mangal Deep publishers
18. VijaikumarUmRao. 2008. Horticulture terms – Definitions and Terminology. IBD publishers, Dehradun

Journals

1. Journal of Indian Horticulture
2. Journal of Acta Horticulture
3. Indian Journal of Horticulturae
4. Journal of ScientiaHorticulturae
5. Journal of Horticulture Sciences and Biotechnology

Web resources

1. <http://aggie-horticulture.tamu.edu/propagation/propagation.html>
2. <http://www.britannica.com/>
3. <http://www.horticulture.com.au/export/hmac.asp>
4. <http://www.horticultureworld.net/hort-india.htm>

FSC 102 Plant Propagation and Nursery Management (1+1)

Aim

To impart knowledge on multiplication and maintenance of horticultural propagules.

Theory

Unit I Introduction and components of propagation

Scope and importance of plant propagation - establishment of nursery - site selection - tools and implements - mist chamber - phytotron - humidifiers - greenhouse - glasshouse - polyhouse - shade net - cold frames - hot beds - pit nursery - media and containers - soil sterilization - manures and manuring - liquid manures - agencies involved in the nursery development - government schemes for development of nurseries.

Unit II Sexual propagation

Importance, advantages and disadvantages - micro and megasporogenesis - apomixis - mono and polyembryony - seeds - quality - nursery bed - protray culture - sowing - seed viability - longevity - germination - dormancy - types of dormancy - seed treatments - seed invigoration - seedling vigour.

Unit III Asexual propagation - cutting and layering

Importance, advantages and disadvantages - methods of vegetative propagation - identification of plus trees - mother block and scion bank - raising clonal nursery - genetic variations - chimeras and types - types of cuttings - factors influencing rooting of cuttings - use of growth regulators - layering - advantages and disadvantages - methods of layering - anatomical and physiological basis of rooting.

Unit IV Asexual propagation - grafting, budding and propagation through specialized plant parts

Grafting and budding methods - advantages and disadvantages - rootstocks - factors for successful graft union - selection, pre-curing and collection of scion - bud wood selection and certification - anatomical and physiological basis of graft / bud union - stock - scion relationship - influence of root stock on scion and scion on root stock - inter stock - methods of graft incompatibility - top working - after care and hardening - techniques of propagation through specialized plant parts - stem and root tubers - bulbs - corms - runners - suckers - crown - slips - rhizome - offshoots

Unit V Micro propagation, Nursery registration act, quality management aftercare and marketing

Micropropagation- Micrografting, meristem culture, callus culture, anther culture, organogenesis, somaclonal variation hardening of plants in nurseries, Nursery registration act. Insect/pest/disease control in nursery, quality management and nursery certification - display, packing, transport and marketing.

Practical

Media and containers - tools and implements - structures for propagation - preparation of nursery beds for raising rootstocks and seedlings - seed treatment - sowing - plug transplants - potting, depotting and repotting of plants - preparation of growth regulators for propagation - scion bank - methods of asexual propagation - cuttings, layering, grafting, budding and specialized plant parts - hardening of propagules - project preparation for commercial nurseries - visit to commercial nurseries and tissue culture units.

Lecture schedule

1. Scope and importance of plant propagation, Agencies involved in the development of nursery, government schemes and economics.
2. Establishment of nursery and site selection Propagation structures, mist chamber, shade net, phytotron, humidifiers, green house, poly house, hot beds and pit nursery
3. Media and containers, soil sterilization, manures and manuring and liquid manures
4. Advantages and disadvantages of sexual and asexual propagation.
5. Micro and megasporogenesis, apomixes, mono embryony and poly embryony
6. Seed quality, dormancy, types of dormancy, viability, germination, longevity, seedling vigour and seed invigoration
7. Seed treatments in sexually propagated crops, formation of nursery bed and plug transplant production
8. Identification of plus trees, mother block, scion bank and clonal nursery, Genetic variations, chimeras and types
9. **Mid semester examination**
10. Types of cuttings, factors influencing rooting of cuttings and use of growth regulators Anatomical and physiological basis for rooting in cuttings and layering
11. Rootstocks and factors for successful graft union Advantages, disadvantages and methods of grafting
12. Budding methods and techniques Selection, precuring and collection of scion, bud wood and certification Top working,
13. Influence of stock on scion, scion on stock, interstock and methods of graft and bud incompatibility
14. Propagation through specialized plant parts viz., tubers, corms, bulbs, rhizome, runner, off shoot, crown, slip, sucker and offshoots.
15. Micropropagation- Micrografting, meristem culture, callus culture, anther culture, organogenesis, somaclonal variation hardening of plants in nurseries. Constraints in micro-propagation
16. Quality management, quality standards and nursery act
17. Aftercare, packing, transport and marketing,

Practical schedule

1. Media, containers, tools and implements for propagation
2. Propagation structures viz., mist chamber, poly house, shade net house, cold frames and hot beds and their maintenance
3. Preparation of nursery beds for raising rootstocks and seedlings, seed treatment, sowing and plug transplants
4. Potting, Pot-bound condition, depotting, repotting of plants
5. Preparation of growth regulators for plant propagation
6. Techniques and methods of propagation through leaf, stem and root cuttings
7. Techniques and methods of propagation through layering
8. Techniques and methods of propagation through grafting
9. Techniques and methods of propagation through budding.
10. Propagation through specialized plant parts
11. Collection and preparation of different types of explants and sterilization for micropropagation.
12. Hardening of propagules
13. Cost of establishment of propagation structures.

14. Project preparation for establishment of commercial nurseries
15. Visit to private nurseries
16. Visit to tissue culture laboratory
17. **Final practical examination.**

Suggested Reading

Text Books

1. Hudson T. Harmann, Dale E. Kester, Fred T. Davies, Jr. and Robert L. Geneve. Plant Propagation – Principles and Practices (7th Edition). PHI Learning Private Limited, New Delhi – 110001
2. T. K. Bose, S. K. Mitra, M. K. Sadhu, P. Das and D. Sanyal, Propagation of Tropical & Subtropical Horticultural crops, Volume 1 (3rd Revised edition). Naya Udyog, 206, Bidhan Sarani, Kolkata 700006.
3. Guy W. Adriance and Feed R. Brison, Propagation of Horticultural Plants, Axis Books (India).
4. Mukherjee, S. K. and Manjumdar, P. K. 1973. Propagation of fruit crops. ICAR, New Delhi.
5. Chandha, K. L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi.
6. Sadhu, M.K.1989. Plant Propagation. Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi 110 002.

Journals

1. Journal of Horticulture Sciences and Biotechnology
2. Indian Journal of Horticulture

VSC 101 Botany of Horticultural Crops (1 + 1)

Aim

To impart knowledge on basic and fundamental aspects on botany of economically important horticultural crops.

Theory

Unit I Introduction to terminologies and concepts

Systematic botany- terminology, morphological description and classification – root, stem, leaf, inflorescence, flower and fruit – flowering mechanism – modes of pollination – asexual/vegetative reproduction – floral biology – fruit set. Principles involved in nomenclature - ICBN rules and recommendations with special reference to names of cultivated plants hybrids/varieties of names.

Unit II Botany of fruit crops

Botany - floral biology – pollination - fruit set and economic parts in the families of Anacardiaceae (mango), Rutaceae (acid lime, sweet orange and mandarin), Musaceae (banana), Moraceae (jack), Vitaceae (grapes), Caricaceae (papaya), Euphorbiaceae (aonla), Myrtaceae (guava), Sapotaceae (sapota), Bromeliaceae (pineapple), Punicaceae (pomegranate), Annonaceae (custard apple), Rhamnaceae (ber) and Rosaceae (apple, pear and plum).

Unit III Botany of vegetable crops

Botany - floral biology- pollination - fruit set and economic parts in the families of Solanaceae (tomato, brinjal, chilli and potato), Malvaceae (Bhendi), Cucurbitaceae (pumpkin, watermelon, coccinia, snake gourd, ridge gourd, bitter gourd and cucumber), Moringaceae (moringa), Fabaceae (peas, french beans, cow pea, clustered bean and lab lab), Alliaceae (onion and garlic), Brassicaceae (cabbage, cauliflower and radish), Euphorbiaceae (cassava), Chenopodiaceae (beet root), Amaranthaceae (amaranthus), Convolvulaceae (sweetpotato), Araceae (elephant foot yam and colocasia) and Dioscoreaceae (yam and dioscorea).

Unit IV Botany of spices and plantation crops

Botany- floral biology- pollination-fruit set and economic parts in the families of Piperaceae (pepper and betelvine) Zingiberaceae (cardamom, turmeric and ginger), Orchidaceae (vanilla and dendrobium orchid), Apiaceae (coriander), Myristicaceae (nut meg), Lauraceae (cinnamon), Caesalpiniaceae (senna), Camelliaceae (tea), Rubiaceae(coffee), Eupharsbiaceae (rubber), Arecaceae (coconut, arecanut, palmyrah and oil palm), Malvaceae (cocoa) and Anacardiaceae (cashew),

Unit V Botany of flower, medicinal and aromatic crops

Botany-floral biology-pollination- fruit set and economic parts in the families of Oleaceae (jasmine), Asteraceae (chrysanthemum, gerbera, marigold and pyrethrum), Amaryllidaceae (lillium), Acanthaceae (crossandra), Caryophyllaceae (carnations), Iridaceae (lilly), Orchidaceae (orchids), Apocynaceae (periwinkle), Poaceae (graminae) (lemongrass), Colchicaceae (glory lilly), Geraniaceae (geranium), Lamiaceae (Labiatae) (coleus) and Scrophulariaceae (digitals).

Practical

Observation and recording the morphology of root, stem, leaf, flower and fruit. Study of taxonomy and morphology of crops in the above families – herbarium (minimum 50 – covering not less than 25 families) collection of the crops mentioned in theory.

Lecture schedule

1. Systematic botany-principles involved in nomenclature.
2. Terminology, morphological description and classification based on root, stem, leaf, inflorescence, flower and fruit.
3. Flowering mechanism – modes of pollination – asexual/vegetative reproduction – floral biology – fertilization and fruit set. Economic parts in the families- ICBN rules and recommendations – special reference to names of cultivated plants and names of hybrids/varieties
4. Anacardiaceae (mango), Rutaceae (acid lime, sweet orange and mandarin) and Musaceae (banana).
5. Moraceae (jack), Vitaceae (grapes), Caricaceae (papaya), Euphorbiaceae (aonla), Myrtaceae (guava) and Sapotaceae (sapota).
6. Bromeliaceae (pineapple), Punicaceae (pomegranate), Annonaceae (custard apple), Rhamnaceae (ber) and Rosaceae (apple, pear, plum, rose).
7. Solanaceae (tomato, brinjal, chilli and potato) and Malvaceae (bhendi).
8. Cucurbitaceae (pumpkin, watermelon, coccinia, snake gourd, ridge gourd, bitter gourd and cucumber).

9. Mid-semester examination.

10. Moringaceae (moringa) and Fabaceae (peas, french beans, cow pea, clustered bean and lab lab) and Alliaceae (onion and garlic).
11. Brassicaceae (cabbage, cauliflower and radish), Chenopodiaceae (beet root) and Amaranthaceae (amaranthus).
12. Euphorbiaceae (cassava), Convolvulaceae (sweet potato), Araceae (elephant foot am, colocasia) and Dioscoreaceae (yam and dioscorea).
13. Piperaceae (pepper and betelvine) Zingiberaceae (cardamom, turmeric and ginger), Orchidaceae (vanilla and dendrobium orchid) and Apiaceae (coriander).
14. Myrtaceae (clove), Myristicaceae (nutmeg), Lauraceae (cinnamom), Malvaceae (cocoa), Caesalpiniaceae (senna).
15. Camelliaceae (tea), Rubiaceae (coffee), Euphorbiaceae (rubber), Arecaceae (coconut, arecanut, palmyrah and oil palm)
16. Oleaceae (Jasmine), Asteraceae (chrysanthemum, marigold, gerbera and pyrethrum), Amaryllidaceae (lillium) and Acanthaceae (crossandra).
17. Caryophyllaceae (carnations), Iradiaceae (lilly), Graminae, (lemongrass), eraniaceae (geranium), Caesalpiniaceae (senna), Labiatae (coleus) Apocynaceae (periwinkle) and Scrophulariaceae (digitals).

Practical schedule

Observation and description of the taxonomy, morphological characters and economic parts of the important horticultural crops in the families

1. Anacardiaceae (mango), Rutaceae (acid lime/ sweet orange /mandarin) and Musaceae banana).
2. Moraceae (jack), Vitaceae (gapes) and Caricaceae (papaya).
3. Euphorbiaceae (aonla), Myrtaceae (guava) and Sapotaceae (sapota).
4. Bromeliaceae (pineapple), Punicaceae (pomegranate), Annonaceae (custard apple), Rhamnaceae (ber), and Rosaceae (apple/pear/ plum/rose).
5. Solanaceae (tomato/ brinjal/ chilli/ potato) and Malvaceae (bhendi).

6. Cucurbitaceae (pumpkin/ watermelon/ coccinia/ snake gourd/ ridge gourd/ bitter gourd/cucumber).
 7. Moringaceae (moringa) and Fabaceae (peas/french /beans/ cow pea/clustered bean /lab lab) and Alliaceae (onion/ garlic).
 8. Brassicaceae (cabbage/ cauliflower/ radish), Chenopodiaceae (beet root), and Amaranthaceae (amaranthus).
 9. Euphorbiaceae (cassava), Convolvulaceae (sweet potato), Araceae (elephant foot yam/ colocasia) and Dioscoreaceae (yam/ dioscorea).
 10. Piperaceae (pepper/ betelvine) Zingiberaceae (cardamom/ turmeric/ ginger),Orchidaceae (vanilla) and Apiaceae (coriander).
 11. Myrtaceae (clove), Myristicaceae (nutmeg), Lauraceae (cinnamon).
 12. Camelliaceae (tea), Rubiaceae (coffee), Malvaceae (cocoa), Euphorbiaceae (rubber), Arecaceae (coconut/ Arecanut/ palmyrah/ oil palm)
 13. Oleaceae (jasmine), Amaryllidaceae (lillium) andAcanthaceae (crossandra).
 14. Asteraceae (chrysanthemum / gerbera/marigold/ pyrethrum), Orchidaceae (dendrobium orchid).
 15. Caryophyllaceae (carnation), Iradiaceae (lilly), Apocynaceae (periwinkle) and Geraniaceae (geranium)
 16. Graminae (lemongrass), Colchicaceae (glory lilly), Caesalpiniaceae (senna), Labiatae (coleus) and Scrophulariaceae(Digitals)
- 17. Practical examination.**

REFERENCES

Text Books

1. Mauseth, J.D. 2009. Botany: an introduction to plant biology. Jones and Bartlett Publishers, MA.
2. Spichiger, R., Savolainen, V., Figeat, M., Jeanmond, D. 2004. Systematic Botany of flowering plants. Science Publishers Inc., USA.
3. Jansi Rani, P. Subramanian, S., Veeraragavathatham and S. Thamburaj, 1997. Botany of vegetable crops. KRS Screen Printers, Lawley Road, Coimbatore.
4. Genin, A. 1994. Application of Botany in Horticulture. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Further readings

1. Gangulee, Das and Datta. 1997. College Botany Vol. I. New Central Book Agency (P) Ltd., 8/1, ChintamaniDaslane, Calcutta – 700 009.
2. Kochhar, S.L. 1992. Economic Botany in the tropics. Macmillan India Ltd., Madras, 600 041.
3. MadhuArora, 1991. Dictionary of Botany. Anmol Publications Pvt. Ltd., New Delhi.
4. Joseph Y. Bergen, 1990. Fundamentals of Botany. Arihant Publishers, Jaipur (India)
5. Subhash Chandra Datt, 1989. Systematic Botany – Willey Eastern Ltd., New Delhi.
6. Bahadur and Achari. 1989. A manual of Botany. Anmol Publications, New Delhi.
7. Sambamurthy and Subrahmanyam. 1989. Text Book of Economic Botany. Wiley Eastern Ltd., New Delhi.
8. Simpson, B.B. and Ogorzaly, M.C. 1986. Economic Botany. McGraw-Hill Book Company, New York.

9. Rameshkumar, A,V.Lakshmanan and T.N.Balamohan 2011 Botany of Vegetable crops. New India Publishers, New Delhi

Journals

1. Journal of Indian Horticulture
2. Journal of Acta Horticulture
3. Indian Journal of Horticulturae
4. Journal of ScientiaHorticulturae
5. Journal of Horticulture Sciences and Biotechnology

Web resources

1. http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookDiversity_6.html
2. <http://waynesword.palomar.edu/index.htm>

AGM 121 Introductory Microbiology (2 + 1)

Aim

1. To enable basic understanding on the microscopic world
2. To introduce the fundamental characteristics of various microorganisms
3. To acquaint the students with the basic laboratory techniques and tools in Microbiology
4. To introduce the commercial utilization of the microbes for Horticulture

Unit I History of Microbiology

Definition, scope and History - Historical roots of Microbiology - abiogenesis (spontaneous) vs. biogenesis theory; germ theory of diseases; microbial world - composition. Contributions of Antonie Van Leeuwenhoek, Louis Pasteur, John Tyndall, Robert Koch, Edward Jenner, Joseph Lister, Alexander Fleming and Selman A. Waksman.

Unit II Microbiological Techniques

General principles of light microscopy - magnification, resolving power and numerical aperture. Microscopy types; light - bright field, dark field, UV, phase contrast and fluorescence; electron microscopes; three dimensional imaging - Atomic force and Confocal scanning laser microscopy. Staining techniques - principle and types of stains; staining methods - simple and differential staining. Sterilization and disinfection techniques - physical and chemical - principle and methods. Isolation, enrichment and purification techniques of bacteria, yeast, molds and actinobacteria. Preservation of microbial cultures.

Unit III Classification and Microbial Cell Structure

Microbial classification- Evolutionary relationship among the living organisms. Whittaker's five kingdom and Carl Woese systems. Prokaryotes and eukaryotes - differences. Three domains of life - similarities and differences; Modern approaches to the bacterial systematics. Differentiation of eubacteria, archae and eucaryotes. Systematic bacteriology; prokaryotic diversity - Bergey's Manual of Systematic Bacteriology. Bacteria - size, shape and arrangement; bacterial cell structure and function. Morphology and economic importance of fungi and algae. Viruses - general properties, types; bacteriophages- morphology: lytic and temperate phages; lytic and lysogenic cycles.

Unit IV Microbial Growth and Genetics

Microbial growth models - bacteria, fungi and yeast - population growth curve. Microbial growth - bacterial growth measurement methods. Factors affecting growth - temperature, oxygen, pH, water activity and salts. Microbial nutrition - types; respiration - aerobic, anaerobic and fermentative modes of respiration. Microbial interactions- antibiosis, symbiosis, intra microbial and extra microbial associations. Bacterial genetics - principles, genetic elements - chromosomal DNA and plasmids, DNA as genetic material. Gene transfer techniques in bacteria.

Unit V Utilization of Microorganisms

Soil microorganisms. Microbial effect on organic and inorganic matter - organic matter decomposition. Biogeochemical cycles. Plant growth promoting microorganisms- nitrogen fixers; mineral solubilizers and mobilizers Industrially important microorganisms in large

scale production and common microbial fermentations; industrial uses of microorganisms- alcohol, antibiotics, vitamins and single cell proteins. Mushroom-types, nutrition and culturing methods.

Practical

Safety in Microbiology laboratory. Microscopes - examination of living microorganisms; handling with microscope. Staining techniques - simple and differential staining (Gram staining). Sterilization techniques and equipments used for sterilization. Growth media preparation - bacteria, fungi and actinobacteria. Isolation, purification and preservation of bacteria, yeast, mold and actinobacteria. Turbidometric estimation of microbial growth. Isolation and characterization of nitrogen fixers and phosphate solubilizers; mycorrhizae. Biofertilizers - types and usage. Food fermentation - sauerkraut; alcohol fermentation- wine fermentation. Mushroom production- spawn production and mushroom cultivation- packing and storage.

Lecture schedule

1. Definition and scope of Microbiology - development of Microbiology. Members of the microbial world
2. Abiogenesis and biogenesis theory. Contributions by Antonie Van Leeuwenhoek and Louis Pasteur - germ theory of diseases.
3. Contributions of John Tyndall, Joseph Lister, Edward Jenner, Robert Koch, Alexander Fleming and Selman A. Waksman.
4. Microscopy; principles - resolving power and magnification. Light microscopy - bright field, dark field, UV, phase contrast and fluorescence microscope.
5. Electron microscopes - TEM and SEM. Atomic and Confocal scanning laser microscopy.
6. Staining - principle and types of stains - staining techniques- simple and differential staining methods
7. Sterilization -- physical and chemical - principle and methods
8. Isolation and enrichment culture techniques; purification and preservation techniques.
9. Evolutionary relationship - position of microbes in living world - concepts and developments in classification of microorganisms
10. Groups of microorganisms - prokaryotes and eukaryotes.
11. Three domains. Archaea - ecology; differences among archaea, eubacteria and eukaryotes
12. Systematic bacteriology - Bergey's manual of systematic bacteriology - eight edition - an outline only.
13. Bacteria- size, shape, structure and arrangement of cells
14. External and internal structures in bacteria and their functions
15. Functional anatomy and reproduction in bacteria
16. Morphology of fungi and economic importance
17. Morphology of algae and economic importance
18. **Mid Semester Examination**
19. Viruses and their properties; bacteriophages - lytic, lysogenic and temperate phages

20. Bacterial growth - population growth and growth cycle – batch and continuous culture – chemostat and turbidostat; synchronous culture
21. Factors influencing growth - temperature, oxygen, pH, water activity and salts. Methods of assessment of growth
22. Nutritional types of bacteria. Metabolic diversity among microorganisms
23. Aerobic respiration, anaerobic respiration and fermentative mode of respiration
24. Microbial interactions- antibiosis, symbiosis, intra microbial and extra microbial associations.
25. Genetic elements in bacteria – structure and function of bacterial chromosome and plasmids; DNA as genetic material
26. Genetic recombination - conjugation, transformation and transduction
27. Importance of soil and plant associated microorganisms- rhizosphere, spermosphere, phyllosphere, epiphytic and endophytic microorganisms
28. Carbon cycle; Role of soil microorganisms and soil enzymes in the decomposition of organic matter and humus formation.
29. Nitrogen cycle – microbiology and biochemistry of mineralization, nitrification and denitrification. Biological nitrogen fixation- free living, associative, endophytic and symbiotic microorganisms
30. Phosphorus cycle – microbial transformation of phosphorus- solubilization and mobilization
31. Sulphur cycle – microbial transformation of sulphur; Potassium releasers/silicate solublizers and zinc solublizers
32. Industrial utilization of microorganisms-alcohol fermentation and alcoholic beverages
33. Antibiotics fermentation (penicillin and streptomycin) and vitamins production (vitamin B2 and B12)
34. Microbes in food industry–mushrooms, single cell proteins, bakers and brewer's yeast, dairy products - cheeses and yoghurt

Practical Schedule

1. Good laboratory practices and safety in Microbiology laboratory. Introduction to glass wares and equipments in Microbiology laboratory
2. Microscopes – handling light microscope and observation of live microorganisms
3. Aseptic techniques – working with equipment and apparatus
4. Preparation of growth media for bacteria, yeast, molds and actinobacteria
5. Isolation of microorganisms by serial dilution technique
6. Purification and preservation of bacteria and actinobacteria
7. Purification and preservation of yeasts and molds
8. Staining techniques - simple and negative staining
9. Differential staining - Gram staining
10. Turbidometric assessment of growth of bacteria
11. Isolation of free living and symbiotic nitrogen fixers
12. Isolation of phosphate solubilizers
13. Examination of mycorrhizal infection in plants
14. Biofertilizer types and usage- Visit to biofertilizer production unit
15. Sauerkraut and wine fermentation
16. Visit to Mushroom production unit

17. Practical Examination

Outcome

1. Skill development in the safe handling, culturing and staining of microorganisms
2. Learning the good laboratory practices required in a Microbiology laboratory
3. To differentiate between bacterial, actinobacterial and fungal cultures
4. Identify the process in which microorganisms are used commercially

Text Books

1. Chan E.C.S. Michael J. Pelczar Jr. Noel R. Krieg 1998. Microbiology, 5th edition, Published by Tata McGraw-Hill Education Pvt. Ltd, pp.926.
2. Michael T. Madigan 2014. Brock Biology of Microorganisms, 14th Edition, Pearson Publishers, pp. 1032
3. ebook: Willey J. Linda S. and Christopher J. Woolverton 2013. Prescott's Microbiology, 9th edition, McGraw Hill Publishing, pp.1139.
4. ebook: Michael J. Leboffee and Burton E. Pierce 2011. A photographic Atlas for the Microbiology Laboratory 4th edition, Morton Publishing Company, pp.256.

Reference Books

1. Hans G. Schlegel, 2012. General Microbiology, 7th edition
2. Ronald M. Atlas, 1997. Principles of Microbiology, Second edition
3. Tortora, G.J., B.R. Funke and C.L. Case, 2009. Microbiology- An Introduction, 9th edition
4. Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). General Microbiology, 5th edition, Prentice Hall of India Pvt. Ltd., New Delhi.

Web pages

<http://www.microbes.info>
<http://aem.asm.org>
<http://microbelibrary.com>
<http://www.rapidmicrobiology.com>

SAC 101 Fundamentals of Soil Science (2+1)

Aim:

To impart knowledge about soils, their formation, pedological and edaphological approaches and physical, chemical and biological properties of soils.

Unit I

Soil as a natural body, Pedological and edaphological concepts of soil. Components of soil. Soil genesis: Composition of Earth's crust- soil forming rocks and minerals – Primary and secondary minerals. Weathering of rocks and minerals. Factors of soil formation. Soil forming processes. Soil Profile.

Unit II

Soil physical properties: Soil texture, structure, density and porosity, soil colour, consistence and plasticity. Soil water retention, movement and availability. Soil air, composition, gaseous exchange-problem and its effect on crop growth. Source, amount and flow of heat in soil, Soil temperature and crop growth.

Unit III

Soil physico chemical and chemical properties: Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability. Electrical conductivity. Soil colloids - inorganic and organic. Silicate clays: constitution and properties, sources of charge, ion exchange, cation and anion exchange capacity and base saturation.

Unit IV

Soil organic matter: composition, properties and its influence on soil properties. Humic substances - nature and properties. Soil Biology : Soil organisms : macro and micro organisms, their beneficial and harmful effects. Soil enzymes. Soil pollution – Types and behaviour of pesticides. Inorganic contaminants. Prevention and mitigation of soil pollution.

PRACTICAL SCHEDULE

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil colour. Determination of soil texture by feel and Bouyoucos Methods. Studies of capillary rise phenomenon of water in soil column and water movement in soil. Demonstration of heat transfer in soil. Preparation and standardization of laboratory reagents, indicators and buffers. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Estimation of organic matter content of soil. Study of soil map.

Lecture Schedule

	Soil definition - Soil as a three dimensional natural body, Pedological and edaphological
2	Components of soil – soil a three phase system- Composition of Earth's crust.
3	Soil genesis: soil forming rocks-definition, formation, Classification of rocks- igneous, sedimentary and metamorphic rocks
4.	Brief description of important rocks - mineralogical composition
5	Minerals- definition, occurrence, classification of important soil forming primary minerals - silicate and non silicate minerals, ferro and non-ferro magnesium minerals
6	Formation of secondary minerals - clay minerals and amorphous minerals
7	Weathering - Rocks and minerals - Physical, chemical and biological weathering
8	Factors of soil formation- Passive and active soil forming factors soil forming factors
9	Soil forming process- Fundamental - Simenson's four fold soil forming process -eluviation, illuviation, translocation and humification
10	Specific Soil forming processes - podzolization, laterization, salinization, alkalization, calcification, decalcification and pedoturbation
11	Soil Profile – Horizons, Master horizons and subordinate horizons, subdivisions, Lithological discontinuity.
12	Soil physical properties: Soil texture - particle size distribution - textural classes - textural triangular diagram - significance of soil texture
13	Soil structure - classification - genesis - factors influencing structural stability - significance of soil structure
14	Soil bulk density, particle density and porosity - factors influencing – significance.
15	Soil colour - causes and measurement - Munsell colour chart - factors influencing soil colour –Significance of soil colour.
16	Soil consistence - cohesion, adhesion, plasticity, Atterberg's constants - upper and lower plastic limits, plasticity number- significance of soil consistence
17	Mid semester Examination
18	Soil water- forms of water, units of expression and pF scale
19	Soil water potentials - gravitational, matric, osmotic- Soil moisture constants and Soil
20	Movement of soil water - Saturated and unsaturated flow - infiltration, hydraulic conductivity, percolation, permeability and drainage
21	Soil air, composition, gaseous exchange – Problem and its effect on crop growth.
22	Source, amount and flow of heat in soil, soil temperature and crop growth.
23	Soil reaction (pH) - definition, pH scale, soil acidity and alkalinity, buffering, effect of pH on nutrient availability and factors affecting soil pH
24	Soil Electrical Conductivity - Factors affecting EC – its significance
25	Soil colloids - inorganic and organic

26	Silicate clays: constitution and classification - 1:1, 2:1 expanding and non expanding - 2:2 clay minerals, amorphous minerals and their properties
27	Sources of charge, ion exchange – positive and negative charge – isomorphous substitution, pH dependant charge.
28	Ion exchange - Cation and anion exchange capacity and base saturation
29	Soil organic matter: composition, properties and its influence on soil properties
30	Humic substances – fractionation, nature and properties, Theories of humus formation.
31	Soil Biology- Soil organisms: macro and micro organisms, their beneficial and harmful effects, Soil enzymes
32	Soil carbon sequestration and carbon trading
33	Soil pollution - behaviour of pesticides and inorganic contaminants
34	Prevention and mitigation of soil pollution

Practical schedule

- 1 Study of soil sampling tools, collection of representative soil sample, its
2. Study of soil profile in field.
- 3 Study of soil forming rocks and minerals.
- 4 Determination of soil density and porosity.
- 5 Determination of soil colour and moisture content and porosity.
- 6 Determination of soil texture by feel and Bouyoucos Methods
- 7 Determination of soil texture by International pipette method.
- 8 Studies of capillary rise phenomenon of water in soil column and water movement in soil (Infiltration Rate)
- 9 Studies of capillary rise phenomenon of water in soil column and water movement in soil (Hydraulic conductivity)
- 10 Determination of soil temperature and demonstration of heat transfer.
- 11 Preparation and standardization of laboratory reagents, indicators and buffers
- 12 Determination of soil pH and electrical conductivity.
- 13 Determination of cation exchange capacity of soil - I.
- 14 Determination of cation exchange capacity of soil - II
- 15 Estimation of soil organic carbon.
- 16 Study of soil map (India and Tamil Nadu)
- 17 Practical Examination

Text Books

1. Brady, N.C. and Raymond, C.Weil. 2013. The Nature and Properties of Soils (14th Edition). Pearson Education, Inc. Publishing as Prentice Hall.
2. Fundamentals of Soil Science. 2009. ISSS Publication, New Delhi.
3. Sehgal, J. 2005. Pedology concepts and applications, Kalyani Publishers, New Delhi.
4. Das, D.K. 2013. Introductory Soil science, Kalyani Publishers, New Delhi.

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2. <http://202.200.144.17/sykc/hjx/content/ckzl/6/2.pdf>
3. http://www.pedosphere.com/volume01/pdf/Section._01.pdf
4. [http://waterquality.montana.edu/docs/homeowners/Septic Drain field Soil Suitability, Presentations /6 _Soil Texture and _Structure.pdf](http://waterquality.montana.edu/docs/homeowners/Septic%20Drain%20field%20Soil%20Suitability%20Presentations/6_Soil%20Texture%20and%20Structure.pdf)
5. http://wfrec.ifas.ufl.edu/landscape_horticulture/PDFdocuments/SoilProp.pdf
6. [http://www.rootsofpeace.org/assets/Soil%Testingq%Manual%20V6%20\(Feb%2008\).pdf](http://www.rootsofpeace.org/assets/Soil%20Testing%20Manual%20V6%20(Feb%2008).pdf)
7. <http://www.soils.wisc.edu/courses/SS325/morphology.htm>
8. <http://www.soils.wis.edu/courses/SS325/morphology.htm>
9. <http://landresources.montana.edu/>
10. [http://ftp.wcc.nrcs.usda.gov/H...soil Other/soil-USDA-textural-class.pdf](http://ftp.wcc.nrcs.usda.gov/H...soil%20Other/soil-USDA-textural-class.pdf)

Out Come

The students will gain knowledge on concepts and principles of analytical techniques. They will also acquire skills in various analytical techniques. Further, the knowledge gained will form as building block to pursue many research works.

BIC 101 FUNDAMENTALS OF BIOCHEMISTRY (2+1)

Theory

UNIT I Carbohydrates

Carbohydrates - occurrence and classification. Structure of monosaccharides, oligosaccharides and polysaccharides. Physical and chemical properties of carbohydrates - optical isomerism, optical activity, mutarotation, reducing property, reaction with acids and alkalis. Glycoconjugates - Glycoproteins and Lectin - structure and significance.

UNIT II Lipids

Lipids - occurrence and classification. Storage lipids - fatty acids, triacyl glycerol, essential fatty acids, waxes. Structural lipids - role of lipids in biological membrane- glycolipids and phospholipids - types and importance; Sterols - basic structure and their importance. Physical and chemical constants of oils. Rancidity of oils.

UNIT III Proteins , Enzymes and Nucleic acids

Amino acids - classification and structure. Essential amino acids. Properties of amino acids - amphoteric nature and isomerism. Classification of proteins based on functions and solubility. Structure of proteins: primary structure, secondary structure, tertiary structure and quaternary structure - protein folding and denaturation. Properties and reactions of proteins. Enzymes - Properties, classification and nomenclature. Mechanism of enzyme action. Factors affecting enzyme activity. Enzyme inhibition - Competitive, Non-competitive and Uncompetitive inhibition; Allosteric enzymes. Coenzymes, cofactors and isoenzyme.
Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure.

UNIT IV Metabolism

Carbohydrate metabolism - breakdown of starch by amylases, glycolysis, TCA cycle and pentose phosphate pathway. Respiration - electron transport chain and oxidative phosphorylation. Bioenergetics of glucose. Lipid metabolism - lipases and phospholipases. Beta-oxidation of fatty acids and bioenergetics. Biosynthesis of fatty acids and triacyl glycerol. General catabolic pathway for amino acids - transamination, deamination and decarboxylation. Ammonia assimilating enzymes. Metabolic inter-relationship.

UNIT V Secondary metabolites

Secondary metabolites - occurrence, classification and functions of phenolics, terpenes and alkaloids.

Practical

Qualitative analysis of carbohydrates, Estimation of starch, amylase. Determination of reducing sugars. Qualitative analysis of amino acids, Sorenson's formal titration of amino acids, Estimation of amino acids, Estimation of protein .Determination of free fatty acid, iodine number of oil. Estimation of ascorbic acid by dye method. Assay of amylase. Estimation of total phenols. Extraction and estimation of lycopene and carotenoids. Separation of amino acids by paper chromatography, Separation of phenols by thin layer chromatography.

Lecture Schedule

1. Introduction to Biochemistry, Carbohydrates - occurrence and classification T2: 1-4, 66-72
2. Structure of monosaccharides T2: 75-82
3. Structure of oligosaccharides and polysaccharides T2: 82-90
4. Physical and Chemical properties of carbohydrates T2: 73-78, T2: 90-95
5. Glycoproteins and lectin - structure and significance T1: 316-321
6. Lipids - occurrence and classification T2: 99-100
7. Storage lipids - Fatty acids and triacyl glycerol; Essential fatty acids, waxes T2: 101-106
8. Structural lipids - Glycolipids and phospholipids - types and importance T2: 107-111
9. Sterols - basic structure and their importance T2: 111-114
10. Physical and chemical constants of oils; Rancidity of oils T2: 114-119
11. Amino acids - Classification and structure T2: 17-21
12. Properties of amino acids - amphoteric nature, isomerism, essential amino acids T2: 21-26
13. Classification of proteins based on function and solubility T2: 26-31
14. Structure of protein - Primary, secondary, tertiary and quaternary structure T2: 31-41
15. Protein folding, physical and chemical properties of proteins T2: 41-43, T1: 52-55
16. Enzymes - Properties, classification and nomenclature T2: 123-127
17. **MIDSEMESTER EXAMINATION**
18. Mechanism of enzyme action T2: 129-131
19. Factors affecting enzyme activity T2: 131-136
20. Enzyme inhibition - competitive, non-competitive, uncompetitive and allosteric enzymes
T2: 136-137, T1: 224-225
21. Coenzymes, cofactors and isoenzyme T2: 127-129, 138

- 22. Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z**
DNA T2 :47-56
- 23. RNA: Types and Secondary & Tertiary structure T2:57-63**
24. Carbohydrate metabolism - breakdown of starch by amylases, Glycolysis - Reactions and bioenergetics T2:159-164
25. TCA cycle - Reactions and bioenergetics T2: 164-168
26. Pentose phosphate pathway - Reactions T2: 174-177
27. Respiration - electron transport chain and oxidative phosphorylation T2: 170-173
28. Lipid metabolism - lipases and phospholipases, Beta-oxidation of fatty acids and bioenergetics T2: 205-208, T2: 208-212
29. Biosynthesis of fattyacids and triacylglycerol T2: 213- 220
30. Transamination, deamination and decarboxylation of amino acids T2: 224-231
31. Ammonia assimilating enzymes - GS, GOGAT and GDH T2: 231-233
32. Metabolic inter-relationship T2: 287-289
33. Secondary metabolites - occurrence, classification and functions of phenolics T2: 274-276
34. Occurrence, classification and functions of terpenes and alkaloids T2: 277-280

www.agriinfo.in

<http://agropedia.iitk.ac.in/>

<http://agritech.tnau.ac.in>

ENG 101 - Comprehension and Communication Skills in English (Gradiual course)

Credit hours: 2(1+1)

Theory

War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English – Spoken English and broken English G.B. Shaw.

Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.

Practical

Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness & Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussions.

Syllabus

ENG 101 - Comprehension and Communication Skills in English (1+1)

THEORY LECTURE SCHEDULE

1. **War Minus Shooting** (A lesson from the Text Book, “The Sporting Spirit” by George Orwell) textual grammar pertaining to factual comprehension and inferential comprehension & referential comprehension.
2. **War Minus Shooting** (A lesson from the Text Book, “The Sporting Spirit” by George Orwell) textual grammar pertaining to global comprehension and attitudinal comprehension

3. **War Minus Shooting** (A lesson from the Text Book, “The Sporting Spirit” by George Orwell) textual grammar on synonyms – antonyms – prefix – suffix – homonyms - homophones – TOEFL & IELTS vocabulary
4. **War Minus Shooting** (A lesson from the Text Book, “The Sporting Spirit” by George Orwell) textual grammar – English articles – preposition – conjunctions and its types
5. **A Dilemma** (A lesson from the Text Book, Layman looks at Science by Raymond Fosdick) textual grammar – verbs – auxiliary verbs - modals and basic tense forms
6. **A Dilemma** (A lesson from the Text Book, Layman looks at Science by Raymond Fosdick) textual grammar – sentence pattern and sentence forms (simple, compound and complex sentences)
7. **A Dilemma** (A lesson from the Text Book, Layman looks at Science by Raymond Fosdick) textual grammar – subject – verb – agreement
8. **A Dilemma** (A lesson from the Text Book, Layman looks at Science by Raymond Fosdick) textual grammar – transformation of sentences
- 9. MID-SEMESTER EXAMINATION**
10. **You and Your English** (A lesson from the Text Book, Spoken English and Broken English by G.B. Shaw) textual grammar – synthesis of sentences – reported speech (direct and indirect speech)
11. **You and Your English** (A lesson from the Text Book, Spoken English and Broken English by G.B. Shaw) textual grammar – paragraph writing (thesis sentences, supporting statements, inferential statements)
12. **You and Your English** (A lesson from the Text Book, Spoken English and Broken English by G.B. Shaw) textual grammar – four principles of writing
13. **You and Your English** (A lesson from the Text Book, Spoken English and Broken English by G.B. Shaw) textual grammar - professional writing – summary writing and paraphrasing, synopsis writing and citation
14. Graham’s flow chart on writing skills
15. Letter writing – personal and social correspondence – job application
16. precise writing – report writing and proposal writing
17. Interview skills - kinds – importance and process

Syllabus

ENG 101 - Comprehension and Communication Skills in English (1+1)

PRACTICAL SCHEDULE

1. Listening - Introduction - Listening vs Hearing - listening modes - types of listening - Intensive and Extensive Listening – practice
2. Process of Listening - methods of enhancing listening - barriers to listening and ways to overcome them – practice
3. Oral communication - organs of speech – English phonemes (consonant table, vowel table) - practice
4. English Stress & Intonation - exercises.
5. Conversation techniques and practice
6. Rate of speech (slow pace, medium pace, rhetoric)
7. Reading - types - skimming and scanning - SQ4R - critical reading - analytical reading – exercises
8. Principles and practice of presentation skills - PowerPoint preparation and presentation
9. Handout preparation - lecture notes preparation - practice and evaluation
10. Writing skills - note taking – precise writing – abstract writing – practice
11. Mind-mapping and article writing
12. Letter writing and rejoinder writing
13. Text writing - practice on table to text conversion
14. Interview skills – types of interview (group interview – panel interview – telephone interview – behavioural interview – video-conferencing interview – mock interview)
15. Practice on speaking skills – welcome address - vote of thanks - short extemporal speech
16. Group discussion – techniques – types and practice

17. PRACTICAL EXAMINATION

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Goodale, Malcolm, *Professional Presentations*, Cambridge University, 2005.

Greenbaum Sidney, *Oxford English Grammar*, New Delhi, Oxford University Press. Peregoy, 2009.

Jones Daniel, *English Pronouncing Dictionary*, Cambridge University Press, 2006.

Lynch, Tony and Kenneth Anderson, *Study Speaking*, Cambridge University, 1992.

Martin Cutts, *Oxford Guide to Plain English*, Oxford University Press, 2004.

Sahaneya Wandy, et.al., *IELTS, Preparation and Practice*, Oxford University, 2005.

Sundararajan, N, *Attentive Listening: How it Matters*, University News, March 19-25, 2005.

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www.essays.com	www.writing-skills.com
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www.bogglesworld.com	www.teachersdesk.com
www.eltweb.com	www.flexiblelearning.net.au

Objective:

To understand and apply fundamental concepts of mathematics applicable in biology and to acquire about theoretical concepts of Algebra, Geometry, Calculus and Mathematical Modeling.

Theory**Unit - I**

Algebra: Permutation and Combination -meaning of nPr and nCr (simple problems). Matrices- Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order by adjoint method, Properties of determinants up to 3rd order and their evaluation.

Unit - II

Analytical Geometry: Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two straight lines, Angles between two straight lines, Parallel lines, Perpendicular lines.

Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) .

Unit - III

Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Partial differentiation with first and second order -Maxima and Minima of the functions of the form $y = f(x)$ and $y = f(x_1, x_2)$ (Simple problems based on it).

Unit -IV

Integral Calculus: Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Unit-V

Mathematical Models: Agricultural systems - Mathematical models - classification of mathematical models- Fitting of Linear, quadratic and exponential models to experimental data.

Practical

Simple problems in Permutation and Combination -meaning of nPr and nCr
Problems in Algebra of matrices , Transpose and Inverse up to 3rd order by adjoint method, evaluation of determinants up to 3rd order. Problems in Straight lines using distance formula, section formula (internal and external division), Change of axes (only origin changed)- Equation of co-ordinate axes- Equation of lines parallel to axes. Problems in equation of a line in : Slope-intercept form, Slope-point form, two point forms, Intercept form, Normal form , General form, Point of intersection of two straight lines. Problems in Angles between two straight lines, Parallel lines, Perpendicular lines. Problems in Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) . Simple problems in limit and continuity. Problems in differentiation of x^n , e^x , $\sin x$ & $\cos x$, derivatives of sum, difference, product and quotient of two functions. Simple problem based on differentiation of functions of functions and Logarithmic differentiation. Simple problems based on differentiation by substitution method. Problems in partial differentiation and Maxima and Minima of the functions of the form $y=f(x)$ and $y=f(x_1, x_2)$. Problems in integration of simple functions and product of two functions- Definite Integral. Integration by substitution method-Problems in Area under simple well-known curves. Problems in fitting linear, quadratic and Exponential models to experimental data.

Theory Schedule:

1. Permutation and Combination -meaning of nPr and nCr (Simple Problems) .
2. Matrices- Definition of Matrices- Types of Matrices- Addition, Subtraction, Multiplication, Transpose
3. Determinants-Properties of determinants -up to 3rd order evaluation and inverse up to 3rd order by adjoint method.
4. Straight lines - Distance formula-section formula (internal and external division) - Change of axes (only origin changed) - Equation of co-ordinate axes- Equation of lines parallel to axes.
5. Forms of equation of Line-Slope-intercept form -Slope one point form - Two point form -Intercept form.
6. Normal form of equation of line- General form of equation of line- Point of intersection of two straight lines.
7. Angles between two straight lines- Parallel lines- Perpendicular lines- Angle of bisectors between two lines.
8. Circle-Equation of circle whose centre and radius is known- General equation of a circle- Equation of circle passing through three given points- Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) .

9. Mid Semester Examination

10. Differential Calculus - Definition of function, limit and continuity- Simple problems on limit and continuity.
11. Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle-Derivatives of sum, difference, product and quotient of two functions- Differentiation using functions of function rule (Simple problem based on it)
12. Logarithmic differentiation (Simple problem based on it)- Differentiation by substitution method and simple problems based on it- Differentiation of Inverse Trigonometric functions
13. Maxima and Minima of the functions of the form $y=f(x)$ and $y=f(x_1,x_2)$ (Simple problems based on it).
14. Integral Calculus - Integration of simple functions and Product of two functions- Definite Integral (simple problems based on it)
15. Integration by substitution method- Area under simple well-known curves (simple problems based on it).
16. Agricultural systems - Mathematical models - classification of mathematical models- Linear model.
17. Quadratic and Exponential models- applications of mathematical models in agriculture.

Practical Schedule:

1. Simple problems in Permutation and Combination.
2. Problems in Addition, Subtraction, Multiplication and Transpose of a matrix
3. Problems in determinants and Inverse up to 3rd order by adjoint method.
4. Problems in Straight lines using distance formula, section formula (internal and external division), Change of axes (only origin changed)- Equation of co-ordinate axes- Equation of lines parallel to axes.
5. Problems in Slope-intercept form of equation of line, Slope-point form of equation of line, two point forms of equation of line, Intercept form of equation of line.
6. Problems in Normal form of equation of line, General form of equation of line, Point of intersection of two straight lines.
7. Problems in Angles between two straight lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines.
8. Problems in Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) .
9. Simple problems in limit and continuity.
10. Problems in differentiation of x^n , e^x , $\sin x$ & $\cos x$, derivatives of sum, difference, product , quotient of two functions and differentiation of functions of functions.
11. Simple problem based on Logarithmic differentiation and differentiation by substitution method.

12. Problems in Maxima and Minima of the functions of the form $y=f(x)$ and $y=f(x_1, x_2)$
13. Problems in integration of simple functions and product of two functions using integration by parts- Definite Integral.
14. Integration by substitution method-Problems in Area under simple well-known curves
15. Problems in fitting linear models to experimental data .
16. Problems in fitting Quadratic and Exponential models to experimental data.
- 17. Final Practical Examination.**

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1. Mehta, B. C. and G. M. K. Madnani, 2014, Mathematics for Economists, Sultan Chand & Sons, New Delhi.
2. Kailasam.C, Pangayar Selvi. R and Vasanthi. R, 2010 , Applied Mathematics, Agrobios (India), Jodhpur
3. James Stewart and Barhara Frank, Calculus, 2008, International Thomson Publishers, Singapore
4. Duraipandian, 2007, Calculus and Analytical Geometry, Emerald Publishers, Chennai.
5. Ranganathan.C.R. 2006, A First Course in Mathematical Models of Population Growth (with MATLAB programs), Associated publishing company, New Delhi
6. Manickavasagam Pillai, T. K and Natarajan, T. 2004. Calculus, Viswanathan Publications, Madras.

2017- ICAR Syllabus

ENG. 102 - DEVELOPMENT EDUCATION (0+1)

(Alternate course for non-Tamil students)

Aim: To impart the students

- Basic principles of learning
- Taxonomy of education
- Career development and entrepreneurship
- Communication skills

Unit I – Basic principles of learning

Basic principles of learning - discussion - Bloom's classification of educational objectives – cognitive, affective, psychomotor domain(s) - teaching and learning.

Unit II – Career development

Career development – growth and development, education – for – life and life – long education, motivation and morale - occupation and profession, training and education, lateral thinking and convergent thinking.

Unit III – Entrepreneurship

Entrepreneur- intrapreneur – managing an intrapreneur – motivation and entrepreneurship -

development – planning, monitoring and evaluation.

Unit IV- Communication skills

Interpersonal communication – transactional communication - role – play - brainstorming – demonstration -the conduct of symposium - conferencing – the concept and presentation of a paper - scientific article writing and editing - popular article writing, editing and blogging -project proposal -project report – writing.

Unit V- Simulation exercises

Simulation - educational simulation-Interactive teaching - business simulation - company's annual report for analysis.

Lecture Schedule

1. Basic principles of learning - binary terms viz., growth and development, education - for - life and life - long education, motivation and morale .
2. Occupation and profession, training and education, lateral thinking and convergent thinking, teaching and learning - discussion.
3. Bloom's classification of educational objectives - cognitive, affective, psychomotor domain(s)
4. Career development - opportunity for graduates of agriculture and allied sciences - discussion
5. Success story of a farmer / entrepreneur - factors involved - role - play.
6. Brainstorming - demonstration.
7. Simulation - Educational Simulation-Interactive Teaching - Business Simulation - Company's annual report for analysis
8. Interpersonal communication - Transactional communication - ice breaker
9. **MID SEMESTER EXAMINATION**
10. The conduct of a symposium
11. Conferencing - the concept and presentation of a paper
12. Scientific Article Writing and Editing
13. Popular Article Writing, Editing and Blogging
14. Project proposal
15. Project Report - writing
16. Entrepreneur - intrapreneur - Managing an intrapreneur - motivation and entrepreneurship development - planning, monitoring and evaluation.
17. **FINAL PRACTICAL EXAMINATION**

Outcome:

- Understand the concepts of learning,
- The necessity for Lifelong education,
- Communication skills in terms of career development

Text book:

1. Sudarsanam.R 1985. "Development Education" Chapter 1,2
2. Krishna Mohan and Meera Banerji, (1990). "Developing Communication Skills", Macmillan Pub. Co., Ch.6,9,10,13 and 15.

e-books:

URL : <http://www.e-booksdirectory.com/details.php?ebook=9481>

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Hariharan.S. *Brainstorming and Interactive Learning*, Research Quarterly, ADU, Coimbatore, 1995.

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Wallace, L.Michael, *Study Skills in English*, CUP Unit.4, 1998.

TAM 101 ,yf;fpa';fspy; ntshz;ika[k; mwptpay; jkpH;g; gadhf;fKk; (0+1)

nehf;fk;

,sepiy ntshz;ik gapYk; khzth;fSf;F jkpH; ,yf;fpa';fs; tHp ntshz;ik kw;Wk; ntshz;ik rhh;e;j bjhHpy;El;g';fisa[k; bra;jpfisa[k; mwpar; bra;jy;- jw;fhy ntshz; bjhHpy;El;g';fnshL bghUj;jpg; gh;h;jjy; - ntshz;ik jtpu njhl;lf;fiy - tdtpay;- ntshz;bghwpapay; - kidapay; rhh;e;j fUj;Jf;fis btspf;bfhzh;jy; - ntshz;;Jiwf;F ,d;wpaikahj fiyr;brhw;fs; - bkhHpg;bgah;g;g[- ghuk;ghpa bjhHpy;El;g';fis mwpar;bra;jy; - khzth;fspd; vjph;fhyj; njitf;F mog;gilahd ngr;Rg;gaph;r;rp - neh;fhziy vjph;bfhs;Sk; tifapy; bkd;jpwd;fshd jiyikg;gz;g[- MSikg;gz;g[- fhynkyhz;ik Mfpatw;wpy; jpwk;bgwr;bra;jy; - khzth;fspd; Ma;t[f;fl;Liu jpwid tsh;j;jy; - ntshz;ik ,jH;fs;/ E}y;fs; Fwpj;J tpHpg;g[zh;it tH';Fjy; - fzpdp tHp jkpHpy; ntshz; bra;jpfis gjntw;wk;/ gjptpwf;fk; bra;a[k; Kiwfis mwpar;bra;jy; Mfpatw;iw nehf;fkf bfhz;L ghli;jpl;l;j;ij tiuaiw bra;jy;.

ghli;jpl;lk;

bjhy;fhg;gpak; fhl;Lk; Kjw;bghUs;/ fUg;bghUs; - r';f ,yf;fpaj;jpy; nthshz; bjhHpy; El;g';fs; - gjpbdz; fPH;f;fzf;F E}y;fspy; ntshz;ikmwptpay; - gs;S ,yf;fpa';fs;/ VbuGgJ/ ,yf;fpaj;jpy; ntshz; bghwpapay; - njhl;ltpay; - tdtpay; kidapay; - NHypay; ntshz;ikg; gHbkhHpf; - ,yf;fpak; fhl;Lk; thH;tpay; bewpKiwfs; - ,f;fhy ,yf;fpa';fspy; ntshz;ikr; rpe;jidfs; - gpiHapd;wpvGJk; Kiwfs; - ghuk;ghpaj; bjhHpy;El;';fs; - ,yf;fpaj;jpy; bkd;jpwd;fs; - mwptpay; jkpH; tsh;r;rpepiyfs; - fiyr;brhy;yhf;fk; - bkhHpbgah;g;g[- fl;Liur; RUf;fk; vGJjy; - fzpdpcyfy; jkpH;

bra;Kiwg; gapw;rpf;fs;

1. bjhy;fhg;gpak; fhl;Lk; Kjw;bghUs;/ fUg;bghUs;/ jhtutpay; mwpt[/ ntshz; khe;jh; Fwpj;j bra;jpfis mwpjy;
2. r';f ,yf;fpaj;jpy; ntshz; bjhHpy; El;g';fs; - (vl;Lj;bjhif/ gj;Jg;ghl;L)
3. gjpbdz; fPH;f;fzf;F E}y;fspy; ntshz;ikmwptpay;
4. gs;S ,yf;fpa';fs;/ VbuGgJ-cHth; thH;tpay; bewpKiwfSk; ntshz;ikj; bjhHpy; El;g';fSk;
5. ,yf;fpaj;jpy; ntshz; bghwpapay; - njhl;ltpay; - tdtpay; - kidapay; - NHypay;
6. ntshz;ikg; gHbkhHpf; - cHt[tpijmwptpay; - gUtk; - kiH - ehw;WeLjy; - vU ,Ljy; - ePh;g;ghrdk; - fisnkyhz;ik-gap;ghJfhg;g[- mWtil-cHth; rKjhak;
7. ,yf;fpak; fhl;Lk; thH;tpay; bewpKiwfs;
8. ,f;fhy ,yf;fpa';fspy; ntshz;ikr; rpe;jidfs; - ghujp/ ghujpjhrd; gilg;g[fs; - g[Jf;ftpij
9. ,ilepiyg; gUtj;njh;t[
10. gpiHapd;wpvGJk; Kiwfs; - vGj;Jg; gpiHfs; - brhw;gpiHfs; - brhw; gphpg;g[g;gpiH-thf;fpag;gpiH-bka;g;g[j; jpUj;jk;
11. ghuk;ghpa ntshz;ikj; bjhHpy;El;g';fs;
12. ,yf;fpaj;jpy; bkd;jpwd;fs; - jiyikg;gz;g[- fhynkyhz;ik
13. MSikg;gz;g[nkk;ghL-kdpj cwt[j;jpwd;fs; tsh;j;jy;
14. mwptpay; jkpH; tsh;r;rpepiyfs;/ ntshz; E}y;fs;/ ntshz; ,jH;fs; - mYtyff; fojk;
15. fiyr;brhy;yhf;fk; - ntshz; fiyr; brhw;fiscUthf;Fk; Kiw-jug;gLj;Jjy; - ,yf;fpantshz; fiyr;brhw;fs;/ tl;lhuntshz;iktHf;Fr; brhw;fs; - mfuhjpapay;
16. bkhHpbgah;g;g[- Kf;fpatpjpf; - goepiyfs; - bkhHpbgah;ghshpd; ,d;wpaikahg; gz;g[fs; - ntshz; bra;jpfisbkhHpbgah;j;jy; - fl;Liur; RUf;fk; vGJjy;

17.fzpdpcyfp; jkpH; - tpf;fpgPoah-ntshz; bra;jpfisg; gjpntw;wk; bra;jy; - ntshz;
bra;jpfis ,izajstHpmwpjy;

nkW;ghh;it E}y;fs;

- fe;jrhkp.,y.br.ntshz;ika[k; gz;ghLk;/ jkpH;ehLntshz;ikg; gy;fiyf;fHfk;/ nfhak;g[j;J}h;/ 1974
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- kPdhl;rpRe;juk;. kh. kw;Wk; V.,y.tprayl;Rkp./ jfty; bjhlh;gpy; jkpH; bkhHpg;gad;ghL/ nf.Mh;.v.Mg;brl; gphpz;lh;/ nfhit- 2002
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- re;jpunrfud;/ ,uh/ bkhHpg;ghlk; - gilg;ghf;fj;jpwd; tsh;j;jy;
- ntshz;fiyr;brhy; ngufuhjp/ jkpH; ehLntshz;ikg; gy;fiyf;fHfk;/ nfhak;g[j;J}h;/ 2008.
- ghnte;jd;/ ,uh/ jkpHpy; mwptpay; ,jH;fs;/ rhKnty;/ @gp#; fpwp!; gjpg;gfk;/ nfhak;g[j;J}h;
- lhf;lh; ,uhjhby;y;g;gd;/ fiyr;brhy;yhf;fk;/ jkpH;g; gy;fiyf;fHfk;/ j";rht{h;